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Delaware Water Gap, N. J. (July 12, C. W. Johnson), and Kaslo, British Columbia (June 11, H. G. Dyar). Two specimens. Type No. 8383, U. S. National Museum.

***Ceroplatus terminalis*, new species.**

Near *clausus*, but the wings are distinctly marked with dark gray toward their apices, the united portion of the third and fourth veins is longer than the succeeding section of the fourth vein, etc. Yellow, the antennæ, an ocellar spot, a median pair of lines on the mesonotum which diverge strongly anteriorly and are united posteriorly, the knobs of the halteres and apices of the tarsi, brown. Antennæ about as long as the thorax, the last joint slightly longer than wide, the others wider than long. Wings hyaline, tinged with yellow along the costa, the apices broadly and hind margin from apex of axillary cell more narrowly bordered with dark gray, which is considerably prolonged along the posterior branch of the fifth vein, a lighter gray spot in apex of the first and of the second posterior cell, the gray color extends along the third vein to a point a short distance basad its upper branch, the latter terminates in the first vein a considerable distance before the apex, auxiliary crossvein slightly beyond the humeral, apex of auxiliary vein beyond the union of the third and fourth. Length 10 mm.

Kaslo, British Columbia. A male specimen collected July 16 by Mr. R. P. Currie. Type No. 8384, U. S. National Museum.

**A CHIRONOMID INHABITANT OF SARRACENIA
PURPUREA, METRIOCEMUS KNABI COQ.**

BY FREDERICK KNAB,

URBANA, ILL.

(PLATE VI.)

During the course of a season's work upon culicid larvæ the writer examined the liquid contents of many leaves of the pitcher-plant, *Sarracenia purpurea*. It was found that the water in these leaves contained, besides larvæ and pupæ of the mosquito *Wyeomyia smithii*, two other forms of dipterous larvæ. One of these was a large maggot of the brachycerous type, perhaps the larva of Riley's *Sarcophaga sarraceniae*, a species which he bred from the leaf contents of *Sarracenia variolaris*.* The other was a small, pale chironomid larva.

The first material was collected on July 30, 1903, on the boggy shores of a pond a few miles from Westfield, Massachusetts. Of the pitcher-plant leaves examined none contained more than one of the

* C. V. Riley: Descriptions and natural history of two insects which brave the dangers of *Sarracenia variolaris*. (Trans. Acad. Sci., St. Louis, 1874, v, 3, p. 235-240).

large maggots. However in most leaves numerous individuals of the chironomid larvæ were present, indeed, they were often more abundant than the larvæ of *Wyeomyia*. In many leaves all three forms of larvæ were found associated. In some leaves the water was converted into an extremely foul liquid, through the decay of large insects that had been entrapped, and in such only the large maggot occurred. But the chironomid larvæ also can endure quite foul water, for in one case they were numerous in a leaf in which had been drowned one of the large *Spirobolus marginatus*.

The chironomid was at once thought to be an unknown form and received such attention as circumstances permitted. Some of the larvæ were reared and produced a little black fly which runs actively but does not take flight so readily as most of its allies. Specimens of the fly were sent to Mr. D. W. Coquillett and were described by him as *Metriocnemus knabi* in the Canadian Entomologist, vol. 36, p. 11. The genus *Metriocnemus* had not previously been reported from the North American continent, although it is a large and widely distributed one and species are known from Greenland and elsewhere in the Arctic region, Europe, South America and Australia. Apparently nothing has been made known regarding the early stages in this genus.

The larvæ of the present species live at the bottom of the water-filled leaf-cups of *Sarracenia purpurea*, burrowing in the closely packed débris composed of the fragments of decayed insects; evidently their food is from this source. These larvæ, unlike those of most species of Chironomidæ, make no tubes. Upon the first occasion only larvæ were found, but this is doubtless because the pupæ were not discovered in their unusual situation. Upon August 23 the locality was visited again and this time pupæ were found — in a most abnormal situation for a chironomid.

Upon the inner surface of the pitcher, just above the water level, was a mass of a clear gelatinous substance, and within this the pupa was suspended in a perpendicular position, head uppermost. Sometimes there were a number of these pupæ in a row, each in its own globule of jelly. When the larvæ pupate close to each other the gelatine secreted by them forms a confluent mass. The jelly mass of an isolated pupa is elongate, slightly flattened, and its lower end extends slightly into the water. So transparent is the jelly that the lower submerged end is scarcely visible, but its tip is indicated by a more opaque portion, which is the cast off larval skin. By this contact with the water the jelly mass is prevented from drying up before the imago can

emerge. When the imago is about to emerge the pupa wriggles to the surface of the gelatinous case. The fly is disclosed within two or three days after pupation.

The writer has found an account of one other species of Chironomidae which pupates within a gelatinous case, but under widely different conditions. It is the European *Chironomus minutus* Zett., of which the early stages are made known by T. H. Taylor in Miall and Hammond's "The Harlequin Fly," p. 11-13. The larva of this insect pupates within a gelatinous case attached to a submerged stone in a stream. The case is perforated by a passage occupied by the pupa and by constant undulations of the pupal body a current of water is kept flowing through the case.

On the other hand, the larva of our *Metriocnemus* forms its gelatinous case above the surface of the water, and there is no passage through the gelatine, but the pupa hangs imbedded in the mass. The pupa, unless disturbed, remains motionless until the time of emergence. The pupa is remarkable also in the entire absence of breathing organs, usually present in chironomid pupæ either in the form of "trumpets" or as tufts of filaments. In the pupa of the above-mentioned *Chironomus minutus* the respiratory trumpets are present, but are extremely small. O. A. Johannsen, in "Aquatic Insects in New York State," has described the pupæ of two species of Chironomidae, which apparently are also without breathing organs. The pupa of *Diamesa waltlii* Meigen is stated to be destitute of the thoracic respiratory appendages, but it is suggested that the three pairs of short hollow filaments at the tip of the last segment may have a respiratory function. In the description of the pupa of *Thalassomyia obscura* (Johan.) no mention is made of respiratory organs, and from the accompanying figure it is to be inferred that they are absent. While no direct statement is made of the pupal habitat of these two species, it appears that pupation takes place within the case previously occupied by the larva.

Metriocnemus knabi appears to have a wide distribution and its range is probably limited only by that of its host-plant. In addition to the locality first mentioned, a bog at Wilbraham, Mass., in which *Sarracenia purpurea* flourishes, furnished me both larvæ and pupæ on August 28, 1903. Early in the spring of 1904, Dr. Geo. Dimmock collected numerous larvæ of various sizes near Springfield, Mass. The larvæ, with those of *Wyeomyia smithii*, were found in the frozen contents of the pitcher plant leaves. Some of these larvæ, under the

influence of indoor temperature, soon pupated and the first imago appeared upon March 15 after a pupal period of three days. Larvæ of this species were collected from *Sarracenia* leaves by Dr. A. D. Hopkins at Boardman, N. C., on April 4, 1904.

In the collection of the Illinois State Laboratory of Natural History are larvæ taken from leaves of *Sarracenia purpurea* at Cedar Lake, Illinois, on June 19, 1892. From the data given it appears that the larvæ may be found at all seasons of the year and that there are no well marked broods. Development proceeds more or less rapidly, depending upon the necessarily variable food supply and upon the temperature. Like the larva of *Wyeomyia* that of *Metriocnemus* is extremely hardy and can linger a long time without food. Of those collected in August, and kept in the original liquid in a tin covered breeding jar, some were still alive early the following April and some few of these completed their transformation; the remainder however were all dead by the end of the month.

Following are descriptions of the larva and pupa of *Metriocnemus knabi*.

Larva (fig. 1). Form long and slender, of the ordinary chironomid type. Length about 7 mm. Color very pale yellow, the head and the appendages of the ninth abdominal segment bright brownish yellow. The body is sufficiently translucent to permit the dark digestive tract and the tracheal tubes (in the form of two silvery sinuate lines) to be readily seen. The tracheal tubes are well developed and may be distinguished through their whole course, until they break up into finer branches in the head and in the ninth abdominal segment. Head rather small, longer than wide, tapering slightly towards the front. The foramen very wide, broadly margined with black. Clypeus prominent, about half the width of the head. Eyes small, in front of the middle, almost lateral. Antennæ (fig. 2) inserted well forward, rather prominent, of four segments; the basal segment large and stout, about three times as long as wide; second segment very slender, about a third the length of the first; third segment still more slender and shorter than the second; fourth segment very small and slender, tapering to a point; upon the apex of the basal segment, inserted beside the second segment, is a large spine or appendiculate segment equalling in length the three outer segments. Mandibles (fig. 3) prominent, stout at base; the outer half slender, curved, tapering to a point and with four teeth upon the inner margin; basal portion greatly dilated and hollowed out, with a large opening upon the inner side; attached to the inner side near the base is a fan-shaped brush of 7 or 8 long hairs with a common base. Labrum (fig. 4) large and rounded, hinged to the head by a narrower flexible strip; the front of the labrum projects over and bears a number of spines and setæ; beneath, well forward and medianly, is a group of curious ciliate appendages and outward from these, a pair of stout curved appendages with densely tufted apices projects downward. These last mentioned appendages appear to correspond to the "mouth tufts" of mosquito larvæ. Beneath, the head is flattened and the epicranial plates are completely fused.

On each side of the mouth a large, broadly rounded, flat lobe projects forward, covering the base of the mandible. Scattered over its surface are a number of setigerous papillæ and along the inner margin several spines. At the apex are the minute rudimentary maxillæ. The labial (fig. 4) plate is very large with a median slightly toothed portion flanked on each side by five larger teeth. Overlapped by the labial plate, and of similar outline with it, is the hypopharynx which bears an elaborate arrangement of spines and setæ.

Body of 13 segments, of nearly equal diameter throughout. Prothoracic segment somewhat longer than the succeeding ones; anteriorly, upon its ventral surface is a large retractile proleg. This is very broad, about three fourths the width of the segment, and about half its length when extended. It is cleft for a short distance and the two lobes are crowned with a dense brush of coarse simple hairs. Behind these brushes are fine transverse ridges beset with minute spines, and these ridges are placed in a series of about twenty closely set rows. The meso- and metathoracic segments are short and almost fused together. There are no appendages of any kind until the ninth and tenth abdominal segments are reached (fig. 5). The ninth abdominal segment bears dorsally and ventrally a pair of tubular appendages, broadened at the base and bearing at the apex a group of six stout and long black setæ. The anal segment is short and less in diameter than the preceding ones. At its tip, dorsally, are four small leaf like blood gills and below these a pair of fleshy extensible prolegs. The prolegs bear a circlet of large hooks of varying shapes and nearly all of them dentate (figs. 6-11).

Pupa (figs. 12, 13). Form rather elongate. Length 3.5 to 4 mm. Color cream yellow, the disc of the thorax pale brownish yellow. Eyes ferruginous, the very small accessory eye black. Eyes prominent and near the apex of the pupa, the minute accessory eye below the compound eye and in contact with it. The antennæ pass behind the eyes in a prominent ridge. The wing pads extend nearly to the lower margin of the second abdominal segment. Segments 2-8 with a dorsal transverse ridge above the hind margin crowned by a crowded row of minute, rounded spines pointing backward; a ferruginous line along their base. A fine dark line defines the front margin of the scuta on these segments. Dorsally at the base of segments 3-8 there is an area densely clothed with coarse bristles, concolorous with the body. The ventral surface of the abdomen is glabrous. At the tip of the body are four rather small laminate appendages which are margined with ferruginous. The larger upper pair lies in a transverse plane, the lower pair is turned obliquely downward.

EXPLANATION OF PLATE VI.

Metriocnemus knabi Coq.

Fig. 1. Larva.

Fig. 2. Antenna of larva.

Fig. 3. Mandible.

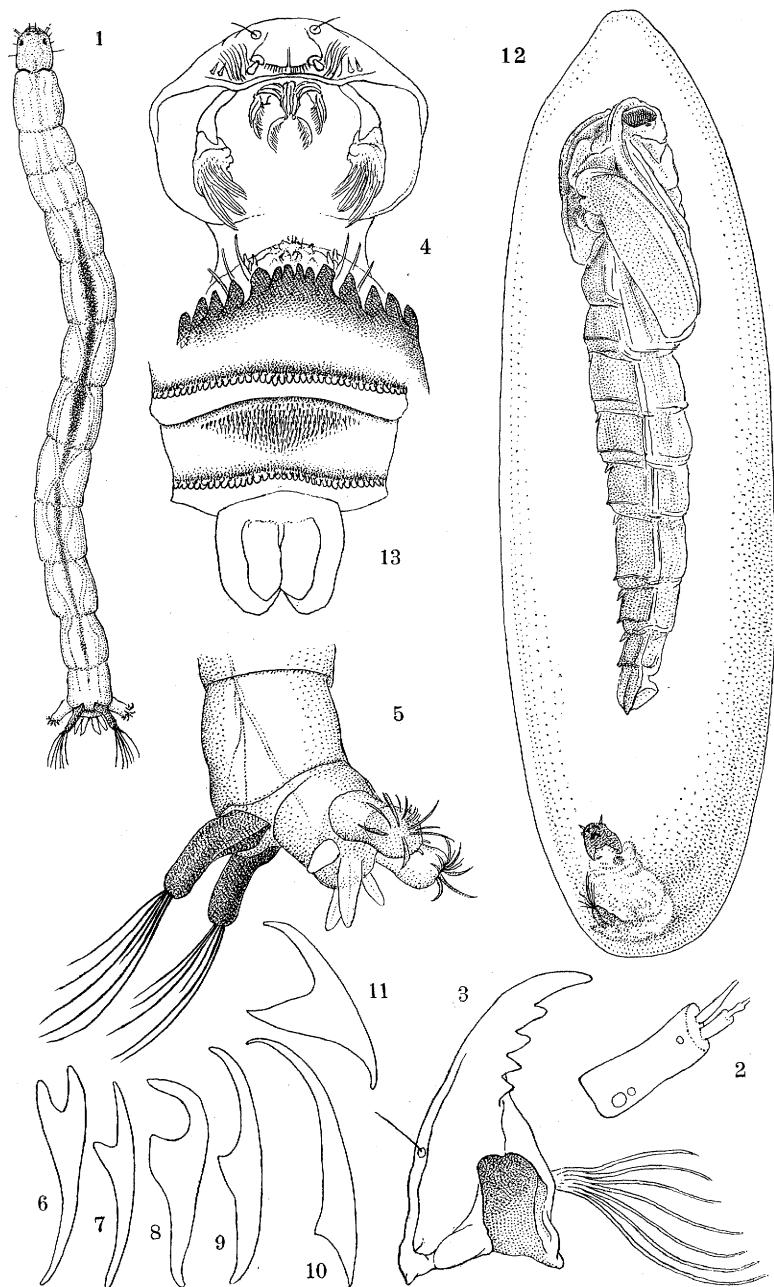
Fig. 4. Labial plate, hypopharynx and labrum (a part of the overhanging dorsal surface of the labrum is seen above).

Fig. 5. Ninth and tenth abdominal segments of larva.

Figs. 6-11. Hooks of posterior prolegs.

Fig. 12. Pupa in its gelatinous case.

Fig. 13. Tip of pupal abdomen, dorsal view.



Metriocnemus knabi Coq.